

Claims

Claim 1 (Original) A process for imparting an aesthetically-pleasing substantive fragrance to, and/or substantially removing a perceived malodour from one or more aqueous surfactant-containing composition-treated solid or semi-solid surfaces during treatment of said surfaces with one or more surfactant-containing compositions comprising the steps of:

- i. providing a plurality of polymer particles (a) having a volume average diameter of from about 0.01 microns up to about 1000 microns; (b) having a solid or viscoelastic infrastructure which is composed of a substance selected from the group consisting of an ethylene-vinyl acetate copolymer containing from about 10% to about 90% vinyl acetate monomeric units, an ethylcellulose polymer, a polystyrene polymer and a polymethyl methacrylate polymer, said polymers having a number average molecular weight of from about 8000 to about 1×10^6 and (c) having a substantially solid or viscoelastic three-dimensional porous infrastructure surrounding a free volume;
- ii. providing a surface treatment quantity of an aqueous composition comprising from about 1% to about 25% by weight of at least one surfactant which aqueous composition is designed to be in contact with said surfaces over a treatment period of time in a surface treatment concentration and temperature;
- iii. providing treatment means for enabling treatment of said surfaces;
- iv. introducing (a) said aqueous composition; (b) said surfaces; and (c) said plurality of particles into said treatment means;

- v. engaging said treatment means for a treatment period of time at a treatment temperature;
- vi. disengaging said treatment means;
- vii. removing said surfaces from said treatment means;
- viii. rinsing said surface; and
- ix. drying said surface

wherein fragrance components of fragrance compositions and malodour molecules are compatible with said polymers.

Claim 2 (Original) The process of claim 1 wherein each of the free volumes of each of the polymer particles provided is initially empty and, during storage or treatment of said surfaces, absorbs components from said aqueous surfactant-containing composition and effects deposition of said fragrance components onto said surfaces.

Claim 3 (Original) The process of claim 1 wherein each of the free volumes of each of the polymer particles provided is initially empty, and during treatment, encapsulates malodourous components from said surfaces.

Claims 4-8 (Canceled).

Claim 9 (Original) The process of claim 1 for imparting an aesthetically-pleasing substantive fragrance to and/or substantially eliminating a perceived malodour from aqueous surfactant-containing composition-treated fabrics, hair follicles, mammalian epidermis or solid surfaces during treatment of said fabrics, hair follicles, mammalian epidermis

or solid surfaces with surfactant-containing compositions comprising the steps of:

- i. providing a plurality of polymer particles (a) having a volume average diameter of from about 0.01 microns to about 1000 microns, (b) having a solid or viscoelastic infrastructure which is composed of a substance selected from the group consisting of an ethylene-vinyl acetate copolymer containing from about 10% to about 90% vinyl acetate monomeric units, a polystyrene polymer, a polymethyl methacrylate polymer and an ethylcellulose polymer, each of said polymers having a number average molecular weight of from about 8000 to about 1×10^6 and (c) having a substantially solid or viscoelastic three-dimensional porous infrastructure having an internal free volume containing a liquid phase fragrance material removably entrapped in said infrastructure, contained in the interstices of said infrastructure and outwardly transportable from said infrastructure, each of the components of which fragrance material having a $C \log_{10} P$ in the range of from about 1 to about 7, the initial weight % of fragrance material contained in said plurality of polymer particles being from about 0.5% to about 50% by weight of the plurality of polymer particles, each of said fragrance components being compatible with said polymer;
- ii. providing a fabric, hair follicle, mammalian epidermis or solid surface treatment quantity of an aqueous composition comprising from about 1% to about 25% by weight of at least one surfactant which aqueous composition is designed to be in intimate treatment contact with, in the alternative, (a) at least one fabric article over a fabric treatment period of time in a fabric

treatment concentration and temperature; or (b) at least one solid surface over a solid surface treatment period of time in a solid surface treatment concentration and temperature; or (c) at least one hair follicle over a hair follicle treatment period of time in a hair follicle treatment concentration and temperature or (d) a mammalian epidermis surface over a mammalian epidermis surface treatment period of time in a mammalian epidermis surface treatment concentration and temperature;

- iii. providing treatment means for enabling treatment of said fabrics, said hair follicles, said mammalian epidermis or said solid surfaces;
- iv. introducing (a) said aqueous composition; (b) said at least one fabric article, said at least one hair follicle, said at least one mammalian epidermis or said at least one solid surface; and (c) said plurality of polymer particles into said treatment means;
- v. engaging said treatment means for a treatment period of time at a treatment temperature;
- vi. disengaging said treatment means;
- vii. removing (a) said at least one fabric article or (b) said at least one solid surface or (c) said hair follicles or (d) said mammalian epidermis surface from said treatment means;
- viii. rinsing (a) said at least one fabric article or (b) said at least one solid surface or (c) said hair follicles or (d) said mammalian epidermis surface; and

ix. drying (a) said at least one fabric article or (b) said at least one solid surface or (c) said hair follicles or (d) said mammalian epidermis surface

wherein fragrance components and malodour molecules are compatible with said polymers.

Claim 10 (Original) The process of claim 9 wherein said treatment is a cleaning treatment.

Claim 11 (Original) The process of claim 10 wherein said polymer particle infrastructure is composed of an ethylene-vinyl acetate copolymer.

Claim 12 (Original) The process of claim 9 wherein the treatment means is a laundry washing machine, and the process is for imparting an aesthetically-pleasing fragrance to and substantially removing a perceived malodour from aqueous surfactant-containing composition-treated fabrics.

Claim 13 (Original) The process of claim 12 wherein said polymer particle infrastructure is composed of an ethylene-vinyl acetate copolymer.

Claim 14 (Original) The process of claim 9 operated according to the mathematical model system:

$$m_p \int_0^\theta \left(\frac{\partial C_p}{\partial \theta} \right)_{C_s, C_w} d\theta + m_w \int_0^\theta \left(\frac{\partial C_w}{\partial \theta} \right)_{C_p, C_s} d\theta + m_s \int_0^\theta \left(\frac{\partial C_s}{\partial \theta} \right)_{C_p, C_w} d\theta = C_T m_T \text{ for the fragrance}$$

composition; and

$$\sum_{i=1}^n (m_p C_{pi} + m_w C_{wi} + m_s C_{si}) = C_T m_T \text{ for "n" individual fragrance components wherein}$$

$1 \leq i \leq n$;

wherein θ represents time in hours;

wherein C_p represents the fragrance concentration in the polymer particle in grams/liter;

wherein $\frac{\partial C_p}{\partial \theta}$ represents the partial derivative of fragrance concentration in the polymer particle with respect to time, measures in grams/liter-hour;

wherein C_w represents the fragrance concentration in the water phase in grams/liter;

wherein $\frac{\partial C_w}{\partial \theta}$ represents the partial derivative of fragrance concentration in the water phase with respect to time measured in grams/liter-hour;

wherein C_s represents the fragrance concentration in the surfactant phase in grams/liter;

wherein $\frac{\partial C_s}{\partial \theta}$ represents the partial derivative of fragrance concentration in the surfactant phase with respect to time measured in grams/liter-hour;

wherein C_T represents the total concentration of fragrance in the system in grams/liter;

wherein m_p represents the mass of the polymer particles in grams;

wherein m_s represents the surfactant mass in grams;

wherein m_w represents the water mass in grams; and

wherein m_T represents the total system mass in grams with all terms being measured at a point in time, θ .

Claim 15 (Original) The process of claim 14 wherein in the mathematical model:

$$m_p \int_0^\theta \left(\frac{\partial C_p}{\partial \theta} \right)_{C_s, C_w} d\theta + m_w \int_0^\theta \left(\frac{\partial C_w}{\partial \theta} \right)_{C_p, C_s} d\theta + m_s \int_0^\theta \left(\frac{\partial C_s}{\partial \theta} \right)_{C_p, C_w} d\theta = C_T m_T$$

$C_p = -k_1 \ln(\theta+1) + k_2$ with $0.015 \geq k_1 \geq 0.03$ and $0.18 \geq k_2 \geq 0.22$;

$C_s = k_3 \ln(\theta+1) + k_4$
with $1.5 \times 10^{-3} \geq k_3 \geq 2.2 \times 10^{-3}$ and $1.2 \times 10^{-4} \geq k_4 \geq 2.0 \times 10^{-4}$; and

$C_w = k_5 \ln(\theta+1) + k_6$
with $1.5 \times 10^{-6} \geq k_5 \geq 3.0 \times 10^{-6}$ and $1.5 \times 10^{-7} \geq k_6 \geq 3.0 \times 10^{-7}$

Claim 16 (Original) The process of claim 9 wherein the plurality of polymer particles is produced by a process comprising the sequential steps of (a) blending polymer pellets with fragrance material for a period of time of from about 0.05 hours to about 20 hours; (b) extruding the resulting product at a temperature of from about 130°C to about 170°C to form an extrudate; (c) cooling the resulting extrudate to a temperature in the range of from about 15°C to about 40°C and (d) cryogrinding the resulting extrudate to form cryoground particles.

Claim 17 (Original) The process of claim 9 wherein the plurality of polymer particles is produced by a process comprising the sequential steps of (a) blending polymer pellets with silicon dioxide and fragrance material for a period of time of from about 0.05 hours to about 20 hours; (b) extruding the resulting product at a temperature of from about 130°C to about 170°C to form an extrudate; (c) cooling the resulting extrudate to a temperature in the range of from about 15°C to about 40°C and (d) cryogrinding the resulting extrudate to form cryoground particles.

Claim 18 (Original) The process of claim 9 wherein the plurality of polymer particles is produced by a process

comprising the sequential steps of (a) extruding polymer pellets with one or more foam forming agents to form a foamed extrudate; (b) cooling the resulting extrudate to form an extrudate tow; (c) particularizing the resulting tow to form microporous polymer particles; and (d) admixing the resulting particles with a fragrance composition, the components of which are compatible with the polymer.

Claims 19-49 (Canceled).

Claim 50 (Original) The process of claim 1 wherein at least a finite portion of the polymeric particles are polymethyl methacrylate polymer particles produced according to the process comprising the steps of:

- (a) milling polymethyl methacrylate to provide polymethyl methacrylate particles having an average effective diameter in the range of from about 5 microns to about 100 millimeters; and
- (b) admixing the resulting milled particles with a plasticizing quantity of a plasticizing compound selected from the group consisting of lower alkanols and lower alkanones or greater than about 10% aqueous solutions thereof for a time period of from about 30 seconds to about 10 minutes thereby forming plasticized polymer particles.

Claim 51 (Canceled).

Claim 52 (Original) The process of claim 50 wherein in the process for producing the polymethyl methacrylate polymer particle composition, the resulting plasticized polymer

particles are separated from the plasticizing compound, and the thus-separated particles are then admixed with a fragrance material which is compatible with the polymethyl methacrylate, whereby from about 0.5% to about 50% by weight of the filled particle of fragrance is absorbed into each of the free volumes of each of the polymer particles.

Claims 53-55 (Canceled).

Claim 56 (Original) The process of claim 52 wherein in the process for producing the particles, the plasticizing composition is an aqueous solution of ethanol.

Claims 57-58 (Canceled).

Claim 59 (Original) The process of claim 52 wherein in the process for producing the particles, the plasticizing composition is a 50% aqueous solution of ethanol.